

## LISTING OF THE CLAIMS

The following listing of the claims replaces all prior versions and listings of claims for this application. Within this listing of the claims, claims 1, 6, 9, 16, 24, 25, 30, 33, 40, 48, 55, and 75 are currently amended and claims 7, 8, 31, 32, and 59 are canceled.

1. **(Currently amended)** A nonpolymeric silsesquioxane in which at least one silicon atom is bound to at least one acid-cleavable alicyclic substituent  $R^{CL}$ , wherein the silsesquioxane has a glass transition temperature  $T_g$  of greater than  $50^\circ\text{C}$  and  $R^{CL}$  is cleavable upon exposure to acid at a temperature below  $T_g$ , and further wherein the silsesquioxane is additionally substituted with at least one polar substituent  $R^P$ .

2. **(Original)** The silsesquioxane of claim 1, wherein  $R^{CL}$  is cleavable upon exposure to acid at a temperature that is at least  $5^\circ\text{C}$  below  $T_g$ .

3. **(Original)** The silsesquioxane of claim 1, selected from: (a) a polyhedral silsesquioxane optionally having one to three open vertices; and (b) a macromer of two to four polyhedral silsesquioxanes that may be the same or different, with each polyhedral silsesquioxane optionally having one to three open vertices.

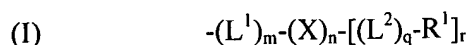
4. **(Original)** The silsesquioxane of claim 3, wherein the polyhedral silsesquioxane of (a) and the polyhedral silsesquioxanes of (b) have from 4 to 10 faces.

5. **(Original)** The silsesquioxane of claim 1, wherein each silicon atom of the silsesquioxane is covalently bound to a moiety selected from: hydrogen;  $R^{CL}$ ; an acid-inert, polar substituent  $R^P$ ; and an acid-inert, nonpolar substituent  $R^{NP}$ .

6. **(Currently amended)** The silsesquioxane of claim 1, wherein the silsesquioxane is additionally substituted with at least one ~~of  $R^P$  and~~ non-polar substituent  $R^{NP}$ .

7-8. **(Canceled)**

9. **(Currently amended)** The silsesquioxane of claim 1, wherein  $R^{CL}$  has the structure



in which:

$m$  and  $q$  are independently zero or 1;

$n$  is 1;

$r$  is an integer of at least 1;

$L^1$  is selected from  $-O-SiR^2R^3-$ ,  $C_1-C_{12}$  alkylene, substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  heteroalkylene, substituted  $C_1-C_{12}$  heteroalkylene,  $C_5-C_{14}$  arylene, substituted  $C_5-C_{14}$  arylene,  $C_5-C_{14}$  heteroarylene, substituted  $C_5-C_{14}$  heteroarylene,  $C_6-C_{14}$  aralkylene, substituted  $C_6-C_{14}$  aralkylene,  $C_6-C_{14}$  heteroaralkylene, and substituted  $C_6-C_{14}$  heteroaralkylene, wherein  $R^2$  and  $R^3$  are hydrogen or  $C_1-C_{12}$  hydrocarbyl, and further wherein when  $L^1$  is optionally substituted and/or heteroatom-containing  $C_3-C_{12}$  alkylene,  $L^1$  may be linear, branched, or cyclic;

$X$  is selected from  $C_3-C_{30}$  alicyclic and substituted  $C_3-C_{30}$  alicyclic;

$L^2$  is selected from  $C_1-C_{12}$  alkylene, substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  heteroalkylene, substituted  $C_1-C_{12}$  heteroalkylene,  $C_5-C_{14}$  arylene, substituted  $C_5-C_{14}$  arylene,  $C_5-C_{14}$  heteroarylene, substituted  $C_5-C_{14}$  heteroarylene,  $C_6-C_{14}$  aralkylene, substituted  $C_6-C_{14}$  aralkylene,  $C_6-C_{14}$  heteroaralkylene, and substituted  $C_6-C_{14}$  heteroaralkylene, and further wherein when  $L^2$  is optionally substituted and/or heteroatom-containing  $C_3-C_{12}$  alkylene,  $L^2$  may be linear, branched, or cyclic; and

$R^1$  is selected from acid-cleavable ester, oligomeric ester, ether, carbonate, acetal, ketal, and orthoester substituents.

10. (Original) The silsesquioxane of claim 9, wherein:

$r$  is 1 or 2;

$L^1$  is selected from  $-O-SiR^2R^3-$  and  $C_1-C_{12}$  alkylene;

$R^2$  and  $R^3$  are hydrogen or  $C_1-C_6$  hydrocarbyl;

$X$  is  $C_3-C_{18}$  alicyclic;

$L^2$  is selected from  $C_1-C_{12}$  alkylene, hydroxyl-substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1-C_{12}$  fluoroalkylene;

$R^1$  is selected from  $-(CO)-O-R^4$ ,  $-[Q^1-(CO)-O]_h-R^5$ ,  $-O-R^6$ , and  $-O-(CO)-O-R^7$ ;

$h$  is an integer in the range of 2 to 8 inclusive;

$Q^1$  is  $C_1-C_{12}$  alkylene or  $C_1-C_{12}$  fluoroalkylene;

$R^4$  and  $R^6$  are selected from (a) hydrocarbyl substituents with a tertiary carbon attachment point, (b) substituents having the structure  $-CR^8R^9-O-CR^{10}R^{11}R^{12}$ , and (c) substituents having the structure  $-CR^{13}(OR^{14})_2$ ;

$R^5$ ,  $R^7$ , and  $R^{14}$  are selected from  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl; and

$R^8$ ,  $R^9$ ,  $R^{10}$ ,  $R^{11}$ ,  $R^{12}$ , and  $R^{13}$  are independently selected from hydrogen,  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and further wherein any two of  $R^8$ ,  $R^9$ ,  $R^{10}$ ,  $R^{11}$ , and  $R^{12}$  may be linked to form a three- to eight-membered cyclic group.

11. **(Original)** The silsesquioxane of claim 10, wherein:

$L^1$  is selected from  $-O-SiR^2R^3-$  and  $C_1$ - $C_6$  alkylene;

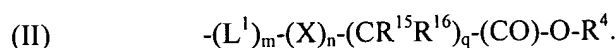
$R^2$  and  $R^3$  are hydrogen or  $C_1$ - $C_6$  alkyl;

$X$  is  $C_6$ - $C_{12}$  alicyclic; and

$L^2$  is of the formula  $-CR^{15}R^{16}-$  wherein  $R^{15}$  is hydrogen,  $C_1$ - $C_{12}$  alkyl, or  $C_1$ - $C_{12}$  fluoroalkyl, and  $R^{16}$  is  $C_1$ - $C_{12}$  alkyl or  $C_1$ - $C_{12}$  fluoroalkyl.

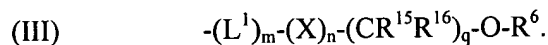
12. **(Original)** The silsesquioxane of claim 11, wherein:

$R^1$  is of the formula  $-(CO)-O-R^4$ , wherein  $R^4$  is selected from cyclic and acyclic hydrocarbyl substituents with a tertiary carbon attachment point, such that when  $r$  is 1, then  $R^{CL}$  has the structure



13. **(Original)** The silsesquioxane of claim 11, wherein:

$R^1$  is of the formula  $-O-R^6$ , wherein  $R^6$  is selected from cyclic and acyclic hydrocarbyl substituents with a tertiary carbon attachment point, such that when  $r$  is 1, then  $R^{CL}$  has the structure

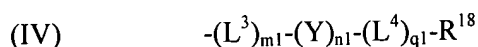


14. **(Original)** The silsesquioxane of claim 12, wherein  $R^4$  is selected from t-butyl, adamantyl, norbornyl, isobornyl, 2-methyl-2-adamantyl, 2-methyl-2-isobornyl, 2-methyl-2-tetracyclododecenyl, 2-methyl-2-dihydrodicyclo-pentadienyl-cyclohexyl, 1-methylcyclohexyl, 1-methylcyclopentyl,

tetrahydropyranyl (THP), tetrahydrofuranyl (THF), 1-ethoxyethyl, 1-methoxy-cyclohexyl, and 1-methoxypropyl.

15. **(Original)** The silsesquioxane of claim 13, wherein R<sup>6</sup> is selected from t-butyl, adamantyl, norbornyl, isobornyl, 2-methyl-2-adamantyl, 2-methyl-2-isobornyl, 2-methyl-2-tetracyclododecenyl, 2-methyl-2-dihydrodicyclo-pentadienyl-cyclohexyl, 1-methylcyclohexyl, 1-methylcyclopentyl, tetrahydropyranyl (THP), tetrahydrofuranyl (THF), 1-ethoxyethyl, 1-methoxy-cyclohexyl, and 1-methoxypropyl.

16. **(Currently amended)** The silsesquioxane of claim [[7]] 1, wherein R<sup>P</sup> has the structure



in which:

m1, n1, and q1 are independently zero or 1;

L<sup>3</sup> is selected from -O-SiR<sup>19</sup>R<sup>20</sup>-, C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, C<sub>5</sub>-C<sub>14</sub> arylene, substituted C<sub>5</sub>-C<sub>14</sub> arylene, C<sub>5</sub>-C<sub>14</sub> heteroarylene, substituted C<sub>5</sub>-C<sub>14</sub> heteroarylene, C<sub>6</sub>-C<sub>14</sub> aralkylene, substituted C<sub>6</sub>-C<sub>14</sub> aralkylene, C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, and substituted C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, wherein R<sup>19</sup> and R<sup>20</sup> are hydrogen or C<sub>1</sub>-C<sub>12</sub> hydrocarbyl, and further wherein when L<sup>3</sup> is optionally substituted and/or heteroatom-containing C<sub>3</sub>-C<sub>12</sub> alkylene, L<sup>1</sup> may be linear, branched, or cyclic;

Y is selected from C<sub>3</sub>-C<sub>30</sub> alicyclic and substituted C<sub>3</sub>-C<sub>30</sub> alicyclic;

L<sup>4</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, C<sub>5</sub>-C<sub>14</sub> arylene, substituted C<sub>5</sub>-C<sub>14</sub> arylene, C<sub>5</sub>-C<sub>14</sub> heteroarylene, substituted C<sub>5</sub>-C<sub>14</sub> heteroarylene, C<sub>6</sub>-C<sub>14</sub> aralkylene, substituted C<sub>6</sub>-C<sub>14</sub> aralkylene, C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, and substituted C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, and further wherein when L<sup>4</sup> is optionally substituted and/or heteroatom-containing C<sub>3</sub>-C<sub>12</sub> alkylene, L<sup>4</sup> may be linear, branched, or cyclic; and

R<sup>18</sup> is an acid-inert polar organic group containing a heteroatom with a Pauling electronegativity greater than about 3.00.

17. **(Original)** The silsesquioxane of claim 16, wherein:

L<sup>3</sup> is selected from -O-SiR<sup>19</sup>R<sup>20</sup>- and C<sub>1</sub>-C<sub>12</sub> alkylene;

Y is C<sub>3</sub>-C<sub>18</sub> alicyclic; and

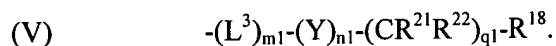
$L^4$  is selected from  $C_1$ - $C_{12}$  alkylene, hydroxyl-substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkylene.

18. **(Original)** The silsesquioxane of claim 17, wherein:

$L^3$  is selected from  $-O-SiR^{19}R^{20}-$  and  $C_1$ - $C_6$  alkylene;

Y is  $C_6$ - $C_{12}$  alicyclic; and

$L^4$  is of the formula  $-CR^{21}CR^{22}-$  wherein  $R^{21}$  is hydrogen,  $C_1$ - $C_{12}$  alkyl, or  $C_1$ - $C_{12}$  fluoroalkyl, and  $R^{22}$  is  $C_1$ - $C_{12}$  alkyl or  $C_1$ - $C_{12}$  fluoroalkyl, such that  $R^P$  has the structure



19. **(Original)** The silsesquioxane of claim 18, wherein the heteroatom within  $R^{18}$  is O or N.

20. **(Original)** The silsesquioxane of claim 19, wherein  $R^{18}$  is selected from hydroxyl, carboxyl,  $C_1$ - $C_{12}$  alkoxy,  $C_1$ - $C_{12}$  fluoroalkoxy, hydroxyl-substituted  $C_1$ - $C_{12}$  alkoxy, hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkoxy,  $C_2$ - $C_{12}$  alkoxyalkyl, fluorinated  $C_2$ - $C_{12}$  alkoxyalkyl, hydroxyl-substituted  $C_2$ - $C_{12}$  alkoxyalkyl, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  alkoxyalkyl, hydroxyl-substituted  $C_1$ - $C_{12}$  alkyl, hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkyl, carboxyl-substituted  $C_1$ - $C_{12}$  alkyl, carboxyl-substituted  $C_1$ - $C_{12}$  fluoroalkyl,  $C_2$ - $C_{12}$  acyl, fluorinated  $C_2$ - $C_{12}$  acyl, hydroxyl-substituted  $C_2$ - $C_{12}$  acyl, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  acyl,  $C_2$ - $C_{12}$  acyloxy, fluorinated  $C_2$ - $C_{12}$  acyloxy, hydroxyl-substituted  $C_2$ - $C_{12}$  acyloxy, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  acyloxy, amino, mono- and di- $(C_1$ - $C_{12}$  alkyl)-substituted amino, amido, mono- and di- $(C_2$ - $C_{12}$  alkyl)amido, sulfonamido, N-heteroalicyclic, oxo-substituted N-heterocyclic, and, where the substituents permit, combinations of two or more of the foregoing.

21. **(Original)** The silsesquioxane of claim 20, wherein  $R^{18}$  is hydroxyl.

22. **(Original)** The silsesquioxane of claim 19, wherein n is 1.

23. **(Original)** The silsesquioxane of claim 22, wherein q is zero.

24. **(Currently amended)** The silsesquioxane of claim [[8]] 6, wherein  $R^{NP}$  is  $C_1$ - $C_{18}$  hydrocarbyl or fluorinated  $C_1$ - $C_{18}$  hydrocarbyl.

25. **(Currently amended)** A lithographic photoresist composition comprising a photoacid generator and a nonpolymeric silsesquioxane in which at least one silicon atom is bound to ~~an~~ at least one acid-cleavable alicyclic substituent  $R^{CL}$ , wherein the silsesquioxane has a glass transition temperature  $T_g$  of greater than  $50^\circ\text{C}$  and  $R^{CL}$  is cleavable upon exposure to acid at a temperature below  $T_g$  and further wherein the silsesquioxane is additionally substituted with at least one polar substituent  $R^P$ .

26. **(Original)** The composition of claim 25, wherein  $R^{CL}$  is cleavable upon exposure to acid at a temperature that is at least  $5^\circ\text{C}$  below  $T_g$ .

27. **(Original)** The composition of claim 25, selected from: (a) a polyhedral silsesquioxane optionally having one to three open vertices; and (b) a macromer of two to four polyhedral silsesquioxanes that may be the same or different, with each polyhedral silsesquioxane optionally having one to three open vertices.

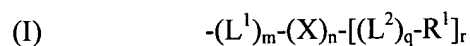
28. **(Original)** The composition of claim 27, wherein the polyhedral silsesquioxane of (a) and the polyhedral silsesquioxanes of (b) have from 4 to 10 faces.

29. **(Original)** The composition of claim 25, wherein each silicon atom of the silsesquioxane is covalently bound to a moiety selected from: hydrogen;  $R^{CL}$ ; an acid-inert, polar substituent  $R^P$ ; and an acid-inert, nonpolar substituent  $R^{NP}$ .

30. **(Currently amended)** The composition of claim 25, wherein the silsesquioxane is additionally substituted with at least one ~~of  $R^P$  and~~ non-polar substituent  $R^{NP}$ .

31-32. **(Canceled)**

33. **(Currently amended)** The composition of claim 25, wherein  $R^{CL}$  has the structure



in which:

$m$ ,  $n$ , and  $q$  are independently zero or 1;

$n$  is 1;

r is an integer of at least 1;

$L^1$  is selected from  $-O-SiR^2R^3-$ ,  $C_1-C_{12}$  alkylene, substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  heteroalkylene, substituted  $C_1-C_{12}$  heteroalkylene,  $C_5-C_{14}$  arylene, substituted  $C_5-C_{14}$  arylene,  $C_5-C_{14}$  heteroarylene, substituted  $C_5-C_{14}$  heteroarylene,  $C_6-C_{14}$  aralkylene, substituted  $C_6-C_{14}$  aralkylene,  $C_6-C_{14}$  heteroaralkylene, and substituted  $C_6-C_{14}$  heteroaralkylene, wherein  $R^2$  and  $R^3$  are hydrogen or  $C_1-C_{12}$  hydrocarbyl, and further wherein when  $L^1$  is optionally substituted and/or heteroatom-containing  $C_3-C_{12}$  alkylene,  $L^1$  may be linear, branched, or cyclic;

X is selected from  $C_3-C_{30}$  alicyclic and substituted  $C_3-C_{30}$  alicyclic;

$L^2$  is selected from  $C_1-C_{12}$  alkylene, substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  heteroalkylene, substituted  $C_1-C_{12}$  heteroalkylene,  $C_5-C_{14}$  arylene, substituted  $C_5-C_{14}$  arylene,  $C_5-C_{14}$  heteroarylene, substituted  $C_5-C_{14}$  heteroarylene,  $C_6-C_{14}$  aralkylene, substituted  $C_6-C_{14}$  aralkylene,  $C_6-C_{14}$  heteroaralkylene, and substituted  $C_6-C_{14}$  heteroaralkylene, and further wherein when  $L^2$  is optionally substituted and/or heteroatom-containing  $C_3-C_{12}$  alkylene,  $L^2$  may be linear, branched, or cyclic; and

$R^1$  is selected from acid-cleavable ester, oligomeric ester, ether, carbonate, acetal, ketal, and orthoester substituents.

34. **(Original)** The composition of claim 33, wherein:

r is 1 or 2;

$L^1$  is selected from  $-O-SiR^2R^3-$  and  $C_1-C_{12}$  alkylene;

$R^2$  and  $R^3$  are hydrogen or  $C_1-C_6$  hydrocarbyl;

X is  $C_3-C_{18}$  alicyclic;

$L^2$  is selected from  $C_1-C_{12}$  alkylene, hydroxyl-substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1-C_{12}$  fluoroalkylene; and

$R^1$  is selected from  $-(CO)-O-R^4$ ,  $-[Q^1-(CO)-O-]_h-R^5$ ,  $-O-R^6$ , and  $-O-(CO)-O-R^7$ ;

h is an integer in the range of 2 to 8 inclusive,

$Q^1$  is  $C_1-C_{12}$  alkylene or  $C_1-C_{12}$  fluoroalkylene,

$R^4$  and  $R^6$  are selected from (a) hydrocarbyl substituents with a tertiary carbon attachment point, (b) substituents having the structure  $-CR^8R^9-O-CR^{10}R^{11}R^{12}$ , and (c) substituents having the structure  $-CR^{13}(OR^{14})_2$ ;

$R^5$ ,  $R^7$ , and  $R^{14}$  are selected from  $C_4-C_{12}$  hydrocarbyl, substituted  $C_4-C_{12}$  hydrocarbyl, heteroatom-containing  $C_4-C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4-C_{12}$  hydrocarbyl; and

$R^8$ ,  $R^9$ ,  $R^{10}$ ,  $R^{11}$ ,  $R^{12}$ , and  $R^{13}$  are independently selected from hydrogen,  $C_4-C_{12}$  hydrocarbyl, substituted  $C_4-C_{12}$  hydrocarbyl, heteroatom-containing  $C_4-C_{12}$  hydrocarbyl, and substituted heteroatom-

containing C<sub>4</sub>-C<sub>12</sub> hydrocarbyl, and further wherein any two of R<sup>8</sup>, R<sup>9</sup>, R<sup>10</sup>, R<sup>11</sup>, and R<sup>12</sup> may be linked to form a three- to eight-membered cyclic group.

35. **(Original)** The composition of claim 34, wherein:

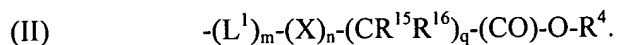
L<sup>1</sup> is selected from -O-SiR<sup>2</sup>R<sup>3</sup>- and C<sub>1</sub>-C<sub>6</sub> alkylene;

R<sup>2</sup> and R<sup>3</sup> are hydrogen or C<sub>1</sub>-C<sub>6</sub> alkyl;

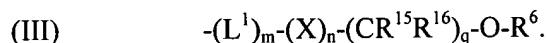
X is C<sub>6</sub>-C<sub>12</sub> alicyclic; and

L<sup>2</sup> is of the formula -CR<sup>15</sup>R<sup>16</sup>- wherein R<sup>15</sup> is hydrogen, C<sub>1</sub>-C<sub>12</sub> alkyl, or C<sub>1</sub>-C<sub>12</sub> fluoroalkyl, and R<sup>16</sup> is C<sub>1</sub>-C<sub>12</sub> alkyl or C<sub>1</sub>-C<sub>12</sub> fluoroalkyl.

36. **(Original)** The composition of claim 35, wherein R<sup>1</sup> is of the formula -(CO)-O-R<sup>4</sup>, wherein R<sup>4</sup> is selected from cyclic and acyclic hydrocarbyl substituents with a tertiary carbon attachment point, such that when r is 1, then R<sup>CL</sup> has the structure



37. **(Original)** The composition of claim 35, wherein R<sup>1</sup> is of the formula -O-R<sup>6</sup>, wherein R<sup>6</sup> is selected from cyclic and acyclic hydrocarbyl substituents with a tertiary carbon attachment point, such that when r is 1, then R<sup>CL</sup> has the structure

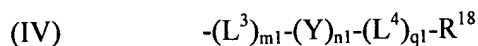


38. **(Original)** The composition of claim 36, wherein R<sup>4</sup> is selected from t-butyl, adamantyl, norbornyl, isobornyl, 2-methyl-2-adamantyl, 2-methyl-2-isobornyl, 2-methyl-2-tetracyclododecenyl, 2-methyl-2-dihydrodicyclo-pentadienyl-cyclohexyl, 1-methylcyclohexyl, 1-methylcyclopentyl, tetrahydropyranyl (THP), tetrahydrofuranyl (THF), 1-ethoxyethyl, 1-methoxy-cyclohexyl, and 1-methoxypropyl.

39. **(Original)** The composition of claim 36, wherein R<sup>6</sup> is selected from t-butyl, adamantyl, norbornyl, isobornyl, 2-methyl-2-adamantyl, 2-methyl-2-isobornyl, 2-methyl-2-tetracyclododecenyl, 2-methyl-2-dihydrodicyclo-pentadienyl-cyclohexyl, 1-methylcyclohexyl, 1-methylcyclopentyl, tetrahydropyranyl (THP), tetrahydrofuranyl (THF), 1-ethoxyethyl, 1-methoxy-cyclohexyl, and 1-methoxypropyl.



40. **(Currently amended)** The composition of claim [[31]] 25, wherein R<sup>P</sup> has the structure



in which:

m1, n1, and q1 are independently zero or 1;

L<sup>3</sup> is selected from -O-SiR<sup>19</sup>R<sup>20</sup>-, C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, C<sub>5</sub>-C<sub>14</sub> arylene, substituted C<sub>5</sub>-C<sub>14</sub> arylene, C<sub>5</sub>-C<sub>14</sub> heteroarylene, substituted C<sub>5</sub>-C<sub>14</sub> heteroarylene, C<sub>6</sub>-C<sub>14</sub> aralkylene, substituted C<sub>6</sub>-C<sub>14</sub> aralkylene, C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, and substituted C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, wherein R<sup>19</sup> and R<sup>20</sup> are hydrogen or C<sub>1</sub>-C<sub>12</sub> hydrocarbyl, and further wherein when L<sup>3</sup> is optionally substituted and/or heteroatom-containing C<sub>3</sub>-C<sub>12</sub> alkylene, L<sup>1</sup> may be linear, branched, or cyclic;

Y is selected from C<sub>3</sub>-C<sub>30</sub> alicyclic and substituted C<sub>3</sub>-C<sub>30</sub> alicyclic;

L<sup>4</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, C<sub>5</sub>-C<sub>14</sub> arylene, substituted C<sub>5</sub>-C<sub>14</sub> arylene, C<sub>5</sub>-C<sub>14</sub> heteroarylene, substituted C<sub>5</sub>-C<sub>14</sub> heteroarylene, C<sub>6</sub>-C<sub>14</sub> aralkylene, substituted C<sub>6</sub>-C<sub>14</sub> aralkylene, C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, and substituted C<sub>6</sub>-C<sub>14</sub> heteroaralkylene, and further wherein when L<sup>4</sup> is optionally substituted and/or heteroatom-containing C<sub>3</sub>-C<sub>12</sub> alkylene, L<sup>4</sup> may be linear, branched, or cyclic; and

R<sup>18</sup> is an acid-inert polar organic group containing a heteroatom with a Pauling electronegativity greater than about 3.00.

41. **(Original)** The composition of claim 40, wherein:

L<sup>3</sup> is selected from -O-SiR<sup>19</sup>R<sup>20</sup>- and C<sub>1</sub>-C<sub>12</sub> alkylene;

Y is C<sub>3</sub>-C<sub>18</sub> alicyclic; and

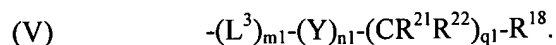
L<sup>4</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> fluoroalkylene, and hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub> fluoroalkylene.

42. **(Original)** The composition of claim 41, wherein:

L<sup>3</sup> is selected from -O-SiR<sup>19</sup>R<sup>20</sup>- and C<sub>1</sub>-C<sub>6</sub> alkylene;

Y is C<sub>6</sub>-C<sub>12</sub> alicyclic; and

L<sup>4</sup> is of the formula -CR<sup>21</sup>CR<sup>22</sup>- wherein R<sup>21</sup> is hydrogen, C<sub>1</sub>-C<sub>12</sub> alkyl, or C<sub>1</sub>-C<sub>12</sub> fluoroalkyl, and R<sup>22</sup> is C<sub>1</sub>-C<sub>12</sub> alkyl or C<sub>1</sub>-C<sub>12</sub> fluoroalkyl, such that R<sup>P</sup> has the structure



43. **(Original)** The composition of claim 42, wherein the heteroatom within  $R^{18}$  is O or N.

44. **(Original)** The composition of claim 43, wherein  $R^{18}$  is selected from hydroxyl, carboxyl,  $C_1$ - $C_{12}$  alkoxy,  $C_1$ - $C_{12}$  fluoroalkoxy, hydroxyl-substituted  $C_1$ - $C_{12}$  alkoxy, hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkoxy,  $C_2$ - $C_{12}$  alkoxyalkyl, fluorinated  $C_2$ - $C_{12}$  alkoxyalkyl, hydroxyl-substituted  $C_2$ - $C_{12}$  alkoxyalkyl, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  alkoxyalkyl, hydroxyl-substituted  $C_1$ - $C_{12}$  alkyl, hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkyl, carboxyl-substituted  $C_1$ - $C_{12}$  alkyl, carboxyl-substituted  $C_1$ - $C_{12}$  fluoroalkyl,  $C_2$ - $C_{12}$  acyl, fluorinated  $C_2$ - $C_{12}$  acyl, hydroxyl-substituted  $C_2$ - $C_{12}$  acyl, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  acyl,  $C_2$ - $C_{12}$  acyloxy, fluorinated  $C_2$ - $C_{12}$  acyloxy, hydroxyl-substituted  $C_2$ - $C_{12}$  acyloxy, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  acyloxy, amino, mono- and di- $(C_1$ - $C_{12}$  alkyl)-substituted amino, amido, mono- and di- $(C_2$ - $C_{12}$  alkyl)amido, sulfonamido, N-heteroalicyclic, oxo-substituted N-heterocyclic, and, where the substituents permit, combinations of two or more of the foregoing.

45. **(Original)** The composition of claim 44, wherein  $R^{18}$  is hydroxyl.

46. **(Original)** The composition of claim 43, wherein n is 1.

47. **(Original)** The composition of claim 46, wherein q is zero.

48. **(Currently amended)** The composition of claim ~~[[32]]~~ 30, wherein  $R^{NP}$  is  $C_1$ - $C_{18}$  hydrocarbyl or fluorinated  $C_1$ - $C_{18}$  hydrocarbyl.

49. **(Original)** The composition of claim 25, further comprising a dissolution modifying additive.

50. **(Original)** The composition of claim 49, wherein the dissolution modifying additive is a dissolution inhibitor.

51. **(Original)** The composition of claim 25, further comprising a polymer selected to provide transparency at a predetermined wavelength.

52. **(Original)** The composition of claim 51, wherein the polymer is selected from silicon-containing polymers and fluorinated polymers.

53. **(Original)** The composition of claim 25, further comprising a solvent.

54. **(Original)** The composition of claim 25, wherein the photoacid generator is an onium salt selected from sulfonium salts and iodonium salts.

55. **(Currently amended)** A process for patterning a substrate, comprising:

(a) coating a substrate with a photoresist composition comprised of (i) a nonpolymeric silsesquioxane in which at least one silicon atom is bound to an acid-cleavable substituent  $R^{CL}$ , wherein the silsesquioxane has a glass transition temperature  $T_g$  of greater than  $50^\circ\text{C}$ , and (ii) a photoacid generator, thereby forming a film;

(b) baking the coated substrate at a post-application bake temperature in the range of about  $90^\circ\text{C}$  to about  $150^\circ\text{C}$ ;

[[[b)]] (c) patternwise exposing the film to an imaging radiation source so as to form a latent, patterned image in the film;

[[[c)]] (d) baking the exposed film at a post-exposure bake temperature below  $T_g$ ; and

[[[d)]] (e) developing the latent image with a developer to form a patterned substrate.

56. **(Original)** The process of claim 55, wherein the nonpolymeric silsesquioxane is selected from: (a) a polyhedral silsesquioxane optionally having one to three open vertices; and (b) a macromer of two to four polyhedral silsesquioxanes that may be the same or different, with each polyhedral silsesquioxane optionally having one to three open vertices.

57. **(Original)** The process of claim 55, wherein the post-exposure bake temperature is at least  $5^\circ\text{C}$  below  $T_g$ .

58. **(Original)** The process of claim 57, wherein the post-exposure bake temperature is at least  $10^\circ\text{C}$  below  $T_g$ .

59. **(Canceled)**

60. **(Original)** The process of claim 57, further including, subsequent to (a) and prior to (b), baking the coated substrate at a post-application bake temperature in the range of about 90°C to about 150°C.

61. **(Original)** The process of claim 58, further including, subsequent to (a) and prior to (b), baking the coated substrate at a post-application bake temperature in the range of about 80°C to about 120°C.

62. **(Original)** The process of claim 55, wherein the radiation is electron-beam, x-ray, ultraviolet, or extreme ultraviolet radiation.

63. **(Original)** The process of claim 62, wherein the radiation is ultraviolet radiation.

64. **(Original)** The process of claim 63, wherein the ultraviolet radiation has a wavelength of 248 nm, 193 nm, 157 nm, or 13.4 nm.

65. **(Original)** The process of claim 64, wherein the ultraviolet radiation has a wavelength of 193 nm.

66. **(Original)** The process of claim 55, further comprising etching the patterned substrate.

67. **(Original)** The process of claim 66, wherein the etching comprises ion etching.

68. **(Original)** The process of claim 55, wherein the film is insoluble, and wherein the developer renders the film soluble where exposed to the imaging radiation source.

69. **(Original)** The process of claim 68, further comprising removing the soluble film.

70. **(Original)** The process of claim 55, wherein the substrate comprises a silicon wafer, a photolithographic mask blank, or a printed circuit board.

71. **(Original)** The process of claim 55, wherein the substrate coated in (a) has a surface layer of an organic material, such that the patterned substrate is composed of a patterned bilayer resist having an underlayer of the organic material.

72. **(Original)** The process of claim 71, wherein the organic material is selected from diazonaphthoquinone/novolac, polyimides, polyesters, and polyacrylates.

73. **(Original)** The patterned substrate prepared by the process of claim 55.

74. **(Original)** The silsesquioxane of claim 2, wherein  $R^{CL}$  is cleavable upon exposure to acid at a temperature that is at least  $10^{\circ}C$  below  $T_g$ .

75. **(Currently amended)** The composition of claim ~~[[25]]~~ 26, wherein  $R^{CL}$  is cleavable upon exposure to acid at a temperature that is at least  $10^{\circ}C$  below  $T_g$ .